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## What Does the Crystal Ball Say About Chlorine Gas?

**R**ecent events, both in Iraq and the United States, have increased concern about possible access to hazardous materials used by water and wastewater utilities and their potential use for acts of terrorism, with an increased focus on chlorine gas. Theft of these materials is a growing concern, in part because chlorine cylinders and containers have been used in vehicle-borne improvised explosive devices in several incidents earlier this year in Iraq. In addition, although no terror nexus has been identified, past attempts at theft of chlorine cylinders in the United States, including several incidents earlier this year, have further increased this concern. This combination of domestic and overseas incidents has raised concerns about water sector security for hazardous materials from Congress, the Department of Homeland Security (DHS), and the US Environmental Protection Agency (USEPA)—the water industry's sector-specific agency.

These incidents have also caused some members of Congress to question the exclusion of water and wastewater utilities in the recently finalized Chemical Facility Anti-Terrorism Standards (CFATS; DHS, 2007). DHS Assistant Secretary for Infrastructure Protection Bob Stephan was recently questioned by Congress about this issue and cited this exclusion as “a gap in our system of regulation.”

### THE CURRENT REGULATORY PICTURE

CFATS is the regulation resulting from Section 550 of the DHS Appropriations Act of 2007,

which granted DHS the authority to regulate high-risk chemical facilities. This regulation was published as an interim final rule Apr. 9, 2007, and uses a risk-based approach to target the chemical facilities that present the highest risk.

DHS has developed the Chemical Security Assessment Tool, a three-step sequential process, to meet the CFATS regulatory requirements for these facilities. The first step is the “Top-Screen,” a relatively simple online questionnaire based on chemicals and trigger amounts listed on the proposed DHS Chemicals of Interest: Appendix A. DHS has identified release, theft, and sabotage as the three main security issues related to these chemicals. Although this list has only been proposed, it is expected to be finalized in the near future. A facility uses the Top-Screen to determine whether the next two steps in the regulatory process are required. If a facility is “screened in,” a security vulnerability assessment and a site security plan detailing security improvements are required to be prepared. Both documents are submitted to DHS and reviewed to ensure that they have been prepared appropriately.

Water and wastewater utilities, as defined by the Safe Drinking Water Act and the Federal Water Pollution Control Act, are currently exempt from this regulation. As Congress debated the Appropriations Act, AWWA and other major water and wastewater organizations advocated for this exclusion based on the water sector's previous security efforts. More than 8,000 water utilities were required to conduct vulnerability assessments (VAs) by the Public

Health Security and Bioterrorism Preparedness and Response Act of 2002. Many wastewater utilities have voluntarily conducted VAs (GAO, 2006). It is estimated that more than 10,000 staff members from utilities, state regulatory agencies, health departments, and consulting agencies have received training in conducting a VA, emergency response planning, developing a public health response, accessing and using the National Incident Management and Incident Command systems, and using security hardware and contamination monitoring technologies. These collective efforts have clearly improved security across the water sector.

To better understand the implications of the regulatory gap in the CFATS, Congress, DHS, and USEPA have been asking several questions:

- How widespread is the use of chlorine gas?
- What does a typical utility do to minimize the off-site consequence of a release?
- What does a typical utility do to control access and to counter possible theft or tampering with its chlorine supply, i.e., what are the typical physical security measures?

There are a number of ways that we as a sector can respond appropriately to these questions. First, a joint effort is being made by AWWA and other major water and wastewater organizations to support a new Web-based survey that will be used to gain insight on the first and third questions. This simple, anonymous survey will attempt to capture the practices and measures that have been implemented to mitigate the potential misuse of hazardous materials, with a focus on chlorine gas. The orga-

nizations collaborating on this survey are encouraging their members to provide the requested information so these important questions can be answered. Some utilities have legitimate concerns about pro-

plicating the issue, Appendix A has yet to be finalized, and it is possible that two thresholds could be developed for a broad range of chemicals. One threshold could be used to address the possibility of theft and resulting

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viding information (even anonymously) on such a sensitive topic. However, getting a high rate of response to this survey is critical to establish a representative sample of the typical physical security measures in place for hazardous materials. A lack of information will increase pressure for potential regulatory outcomes and will severely challenge our ability to provide an assessment of utilities' current security measures and how those measures might fit into a regulation in the event this outcome becomes inevitable.

The answer to the second question is readily available through an analysis of the existing risk management plans (RMPs) that were developed as a regulatory requirement under the Clean Air Act (CAA). However, the chemicals and thresholds in the proposed CFATS Appendix A are different from those in the CAA RMPs. For example, chlorine gas has a screening threshold quantity of 1,875 lb under the proposed CFATS Appendix A but 2,500 lb under the CAA RMPs. This distinction could be significant for smaller water and wastewater plants. Further com-

malevolent use and the second could be used to address potential off-site releases.

Second, the general trends from the survey will provide critical data to support the next step in filling the information gap. The survey findings will feed into a larger project funded by the Water Industry Technical Action Fund. The results of this project will provide the framework for a robust disinfection strategy evaluation, which will include such factors as safety, water quality, volume of disinfectant required, disinfection efficacy, resiliency, transportation, and cost. In addition, this project will develop recommended guidelines for physical security, operations, and transportation of hazardous materials, with a focus on chlorine gas.

## EVALUATING DISINFECTION CHOICES

From a utility perspective, the choice of disinfectant is a complex issue that balances many competing points of view. For example, USEPA regulations require the use of a disinfectant (for surface water and groundwater under the influence of surface water) but have also

recently tightened limits on disinfection by-products (DBPs). Many utilities are switching to chloramine as a secondary disinfectant in the distribution system to comply with the Stage 1 and 2 Disinfectants/Disinfection Byproducts Rules. That change carries its own set of operational issues for the distribution system. Chloramines are not as effective as chlorine for many potential pathogens of concern (Rose et al, 2007) but are more persistent and form fewer chlorinated DBPs. From a security perspective, switching to chloramine puts another hazardous chemical—ammonia—at the treatment plant. Additional concerns about the response of water quality sensors to potential contamination in chloraminated water have resulted from ongoing research. To address these concerns, USEPA and DHS need to start the process for a holistic debate on competing regulatory and security issues for chlorination versus chloramination.

AWWA wants to ensure that the choice of disinfectant remains a local issue. This is not an issue

that should be mandated by Washington. AWWA has worked to maintain this local decision-making process through congressional education on all of the water security efforts to date and on all of the factors that need to be considered in a robust evaluation. Legislative decisions on complex issues such as this need to be carefully thought out and not be based on an immediate reaction to the media.

Utilities also need to initiate their own robust evaluation of chlorine gas and its alternatives that includes the factors outlined in this article. A utility should be able to maintain the use of chlorine gas after an appropriate evaluation with community outreach and input. Almost everyone recognizes that drinking water and wastewater utilities have taken significant steps to enhance the overall security of their facilities and operations beyond the completion of VAs and compliance with CAA RMP and Occupational Safety and Health Administration requirements.

So what does the crystal ball say about chlorine gas? Future actions by Congress are difficult to predict, but it is very possible that the water sector may no longer be excluded from CFATS. The ability to make a local choice about disinfectants will likely be affected by congressional action, so utilities should start considering potential implications. Utilities are also encouraged to provide the requested information regarding security practices for hazardous materials via the Web-based survey, continue to monitor the issue, and be prepared to

defend their local decision-making ability. Congressional action likely will not mandate the elimination of chlorine gas, but utilities that make the local decision to continue using chlorine gas and other materials of concern will likely have to provide the appropriate physical security measures—as yet undefined—to mitigate potential adverse consequences from tampering and/or theft.

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